Fisheries and Oceans Canada | Pêches et Océans Canada
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Quebec Region
Canadian Science Advisory Secretariat
Science Advisory Report 2013/027

STOCK ASSESSMENT ON SCALLOP OF THE INSHORE WATERS OF QUEBEC IN 2012

Figure 1. Scallop fishing areas in Quebec.

Context

In the Gulf of St. Lawrence, two species of scallops are commercially fished, namely the sea scallop (Placopecten magellanicus) and the Iceland scallop (Chlamys islandica). The scallop fishery is an inshore fishery using the Digby dredge and catches are landed mostly as meat (muscle). Given the difficulty in visually distinguishing between the meat of the two species, commercial fishing statistics are presented regardless of the species. However, catches in any one area usually consist of just one species.

Quebec waters are divided into 24 fishing areas (Figure 1) to which access is limited to a small number of fishermen. Fishing effort is controlled by a fishing season and catches are limited by quotas or by a limited number of fishing days.

The resource is assessed every three years to determine whether changes that have occurred in stock status require adjustments to the conservation approach and management plan. The main indicators used for the assessment are taken from fishery statistical data, sampling of commercial catches and research surveys.

A science peer review meeting was conducted February 6, 2013 in Mont-Joli, Qc. Participants at the science review were from DFO Science, DFO Fisheries Management, fishing industry, provincial governments, and Aboriginal organisations.

SUMMARY

- From 2010 to 2012, annual scallop landings in Quebec totalled an average of 68 t of meat, a decrease of 29% compared to 2007–2009 without any reduction in fishing effort. Landings from the Magdalen Islands were at 67%, the North Shore at 26% and the Gaspé Peninsula at 7%.

North Shore

- Landings and fishing effort on the North Shore continued to drop in 2010–2012, by 57% and 67%, respectively, compared to 2007–2009.
- From 2010 to 2012, there was no fishing effort in areas 16A1, 16A2, 16B, 16C, 16D, 16G, 16H, 16I, 18A and 18D, and very little fishing effort in Area 15. The status of the resource is therefore unknown in these areas.
- Since 2008, the fishery has become concentrated in Area 16E on bed D south of Grande Île, where recruitment was very good in previous years. This resulted in the stabilization of catches per unit effort (CPUE) and an increase in the average weight of landed meat. There was little harvesting in the other beds, where CPUE were below the historical average. The research survey indicates that the abundance of scallops larger than 70 mm has declined steadily since 2000, reaching the lowest value of the historical series in 2012, whereas that of scallops smaller than 70 mm is above the series average. It is therefore recommended that the fishing effort in Area 16E be reduced while limiting the effort in bed D to that observed in recent years.
- CPUE in Area 16F have been declining and below the reference average since 2005. The 2012 research survey indicates that the abundance of scallops larger than 70 mm is below the historical series average, whereas the abundance of scallops smaller than 70 mm is above average. It is therefore recommended that the fishing effort be maintained at the same level as that observed in recent years.

Gaspé Peninsula

- Landings of sea and Iceland scallops in the Gaspé Peninsula dropped by 30% in 2010–2012 compared to 2007–2009 without a significant reduction in fishing effort.
- Fishing effort was nil in areas 17A1, 18B2 and 18C and very low in areas 17A2 and 18B1 from 2010 to 2012. The status of the resource is therefore unknown in these areas.
- In Area 19A, landings and fishing effort in 2012 represented the lowest values of the historical series. CPUE have been very low and declining since 2008, but harvesting rates in the main beds are stable.
- The proportion of sea scallops below the minimum legal size of 100 mm that were observed in commercial at-sea sampling is high in Area 19A. The selectivity of the dredge should be adjusted so as to decrease catches of these scallops. Increasing the ring diameter to 89 mm is recommended.
- Because of the low fishing effort and the presence of protected areas, it is recommended to maintain this effort at the same level as that of recent years.

Magdalen Islands

- In Area 20A, sea scallop landings increased significantly in 2007 and have since been stable. The fishing effort is well distributed over all of the beds.
- CPUE from 2010 to 2012 were lower compared to 2007–2009 but remained above the reference average.
- The 2011 research survey indicates that commercial-size and pre-recruit scallop (85 to 100 mm) abundance is above the historical series average, whereas abundance of scallops smaller than 85 mm is comparable to the average.

- Decision rules to determine fishing effort have been in place since 2010. This effort is calculated using CPUE from logbooks and abundance indices from the research survey. Fishing effort is to be reviewed annually after the indicators have been updated.
- The maximum fishing effort recommended for Area 20A in 2013 is 314 days at sea.

INTRODUCTION

Species Biology

There are two indigenous species of scallops in Quebec: the sea scallop (*Placopecten magellanicus*) and the Iceland scallop (*Chlamys islandica*). These two species are found mainly on gravel, shell or rocky bottoms, generally at depths of 20 to 60 metres. Scallops are sedentary and live in aggregations known as "beds". This aspect of their biology needs to be taken into account when developing conservation strategies and management plans. The exploited beds of Iceland scallops are found mainly along the North Shore, around Anticosti Island and off the north coast of the Gaspé Peninsula (Figure 2). In contrast, the exploited beds of sea scallops are found primarily in the southern Gulf, including the Magdalen Islands and Chaleurs Bay, and occasionally along the Lower North Shore.

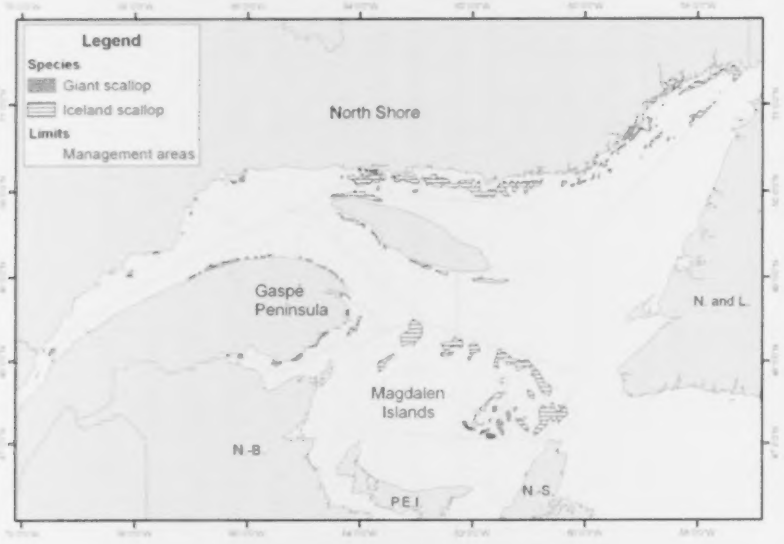

Figure 2. Known distribution for sea scallop and Iceland scallop in Quebec coastal waters.

Sea scallops grow in length more rapidly than Iceland scallops. Their growth rate varies from one Area to another and is affected by habitat quality and environmental conditions. In the Gulf of St. Lawrence, Iceland scallops reach commercial size at about age 8 (70 mm) and sea scallops at about age 6 (100 mm).

In scallops, the sexes are separate and eggs are fertilized externally. Scallop egg production is proportional to its size cubed, with successful fertilization depending on the proximity of other scallops. The spawning period is short and does not occur at the same time throughout the Gulf. Along the North Shore and around Anticosti Island, spawning occurs between mid-July

and late August, depending on the sector. Sea scallops spawn in August in Chaleurs Bay and beginning in late August around the Magdalen Islands.

Larval development takes about five weeks, from fertilization to settlement on the seabed. During this time, the larvae are dispersed throughout the water column. Juvenile scallops generally attach themselves to the seabed in proximity to the adults. Scallop beds are usually found in Areas where currents enhance larvae retention, but a good substrate is needed to ensure the successful attachment of juveniles. During the settlement period, juveniles are very sensitive to disturbance of the sediment by fishing gear. As a result, to ensure the survival of juvenile settled on the bottom, it is recommended that scallop beds not be dredged from August to November.

The meat yield by weight of a scallop of a given size varies over the reproductive cycle. Muscle weight peaks in spring just before gonad development, and drops to its lowest point during the spawning period, and starts rising again in the fall.

Description of the Fishery

The commercial scallop fishery in Quebec began in the late 1960s. It is an inshore fishery using mainly the Digby dredge. The commercial fishery is targeted at both scallop species and catches are landed mostly as meat (muscle). In this report the commercial fishing statistics have been expressed as meat. The difficulty in visually distinguishing between the meat of the two species complicates the analysis of fishing statistics. However, the two species are not distributed uniformly in the Gulf of St. Lawrence, and catches in any one Area usually consist of just one species.

Quebec waters are divided into 24 fishing Areas, which are grouped into three sectors, namely the North Shore (Areas 15, 16A1, 16A2, 16B, 16C, 16D, 16E, 16F, 16G, 16H, 16I, 18A, 18D), the Gaspé Peninsula (Areas 17A1, 17A2, 18B1, 18B2, 18C, 19A) and the Magdalen Islands (Areas 20A, 20B, 20C, 20E, 20F) (Figure 1). Only few fishermen are active in the majority of these Areas and there has been little or none fishing effort there. In 2012, 80 regular licences and 2 exploratory licences were issued. Management plans were developed for each Area, based on the following factors: vessel length, dredge size (<7.31 m), fishing season and hours, individual and overall quotas or number of fishing days permitted (Table 1).

A major change in the mode of fishery management in Areas 16E, 16F and 18A occurred in 2006. Harvesting is now managed by controlling the effort, i.e. by a limited number of fishing days for the season and fishing hours per day. Management based on the number of fishing days has also been applied to Area 20A of the Magdalen Islands since 2007 and decision rules have been applied since 2010 to determine the fishing effort.

Table 1. Scallop fishery management measures in 2012.

Area	Number of licences	Quota (t meat or day-at-sea)	Season (day/month)	Daily schedule	Coverage for dockside weighing	Hail out	Hail in	At-ser observers (% of trip)	VMS[1]	Sea sca. Limit size ; Meat count[2]
15	33 + 2[3]		14/05 – 31/12							
16A1	1	10.9 t	11/04 – 02/12			100 %	100 %	5 %	100 %	
16A2	1	3.8 t	11/04 – 02/12				100 %		100 %	
16B	1	6.8 t	11/04 – 18/11				100 %			
16C	2	12.8 t	09/05 – 28/10		100 %	100 %	100 %	5 %		
16D[4]		6.1 t	11/04 – 04/11				100 %			
16E	9	277 days	01/04 – 31/12	6h – 16h	sporadic	100 %	100 %		100 %	
16F	9	164 days	01/04 – 31/12	6h – 16h	sporadic	100 %	100 %		100 %	
16G	3	13.7 t	18/04 – 11/11				100 %			
16H	8	8.3 t	11/04 – 04/11		100 %		100 %			
16I[5]			14/05 – 31/12							
17A1	1	10.9 t	01/04 – 30/11				100 %	5 %	100 %	100 mm; 33
17A2	1	4.0 t	01/04 – 30/11				100 %		100 %	100 mm; 33
18A	9	258 days	01/04 – 31/12	6h – 21h	sporadic	100 %	100 %		100 %	
18B1	3		01/05 – 30/09				100 %		100 %	100 mm; 33
18B2	3	16.0 t	01/04 – 30/11				100 %		100 %	100 mm; 33
18C	3	11.0 t	01/04 – 30/11				100 %		100 %	
18D[6]	1	10.0 t	25/04 – 04/11				100 %			
19A	3		01/05 – 30/09	Day[7], hour			100 %		100 %	100 mm; 33
20A	23	322 days	26/03 – 31/07	Day[7], hour			100 %		100 %	95 mm; 31
20B	23		26/03 – 31/07	Day[7], hour			100 %		100 %	95 mm; 31
20C	23		26/03 – 31/07	Day[7], hour			100 %		100 %	95 mm; 31
20E	Protected Area									
20F	23		26/03 – 31/10	Day[7], hour			100 %		100 %	95 mm; 31

[1] = Vessel Monitoring System (VMS)
[2] = Meat count: maximum number of meat in 500g
[3] = Exploratory licence for Iceland scallop
[4] = Open to all scallop licence holders residing between Sept-Îles and Pointe Parent
[5] = Open to licence holders in area 15
[6] = Open to all scallop licence holders residing between Tadoussac and Pointe Parent
[7] = Depending of days of week

From 2010 to 2012, the average annual landings totalled 68 t of meat, a decrease of 29% compared to 2007-2009 (Figure 3). They came in order of importance from Magdalen Islands (67%), North Shore (26%) and Gaspé Peninsula (6%). During this same period, the fishing effort was comparable in Quebec compared to 2007-2009 (Figure 4), while a decrease in North Shore (67%) and an increase in Magdalen Islands (19%) were observed.

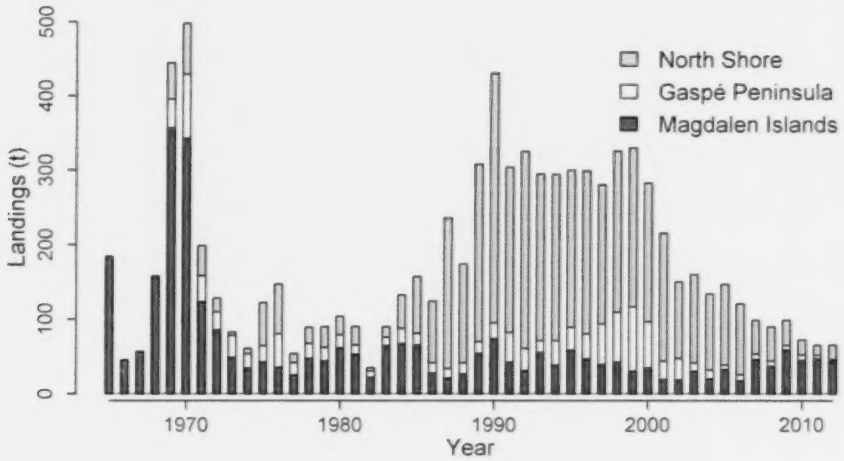

Figure 3. Scallop landings in Quebec.

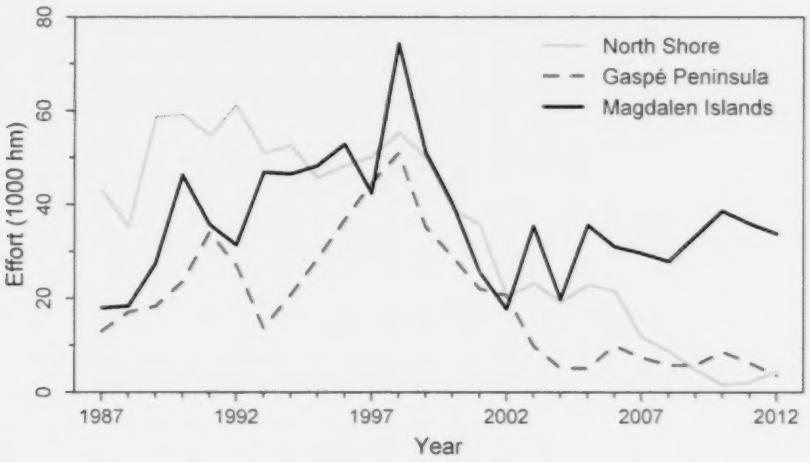

Figure 4. Fishing effort in Quebec (standardized fishing hour per meter of dredge width).

RESOURCE ASSESSMENT

The assessment of the status of scallop populations is based mainly on an analysis of commercial indices derived from logbooks and sampling activities at sea or at dock-side (Tables 2 and 3). For scallop beds in the Mingan sector (Areas 16E and 16F) and the Magdalen Islands, it also incorporates indices derived from the research surveys that are carried out every two years.

Table 2. Catch per unit of effort (kg of meat per hour of fishing and meter of dredge width) estimated from logbooks.

	Fishing area								
Year	15	16A1	16E*	16F*	17A2	18A*	18B1	19A	20A
2003	1.64	4.59	2.38	2.06	1.27	1.50	1.44	0.68	0.87
2004	2.09	3.36	1.89	2.35		1.44	2.31	0.72	0.87
2005	2.08	2.69	1.74	2.10		1.55	5.81	0.83	0.84
2006	2.34	1.14	1.57	1.65	0.60	1.27	2.03	0.85	0.60
2007	1.74		1.38	1.55	0.48	1.13	2.60	0.92	1.64
2008			1.80	1.61		1.11	2.38	1.12	1.37
2009	1.97	2.91	1.92	1.37	0.66	0.48	2.71	0.95	1.83
2010	1.73		1.83		1.24		2.91	0.81	1.24
2011	1.41		2.14	1.30			4.20	0.73	1.35
2012	1.23		1.67	1.38	0.64			0.63	1.32
Average 1992-2009	1.77	6.05	1.80	1.81	1.40	1.26	1.94	0.97	0.99

*: kg of meat per fishing tow and meter of dredge width

Table 3. Mean weight of meats (g) at landing.

	Fishing area								
Year	15	16A1	16E	16F	17A2	18A	18B1	19A	20A
2003	13.0	11.3	13.5	14.2	17.1	9.9		21.0	19.7
2004		7.9	13.0	12.0		8.0	29.3	19.9	21.7
2005	16.8	7.6	10.4	10.9		10.0	32.4	16.1	21.0
2006	12.9	7.5	11.5	11.2	13.0	7.7	30.8	16.4	18.5
2007			12.2	11.6	11.9		35.7	21.1	19.2
2008			11.3	11.3			36.1	19.5	27.8
2009		6.0	10.8				31.0	18.1	16.1
2010			10.7				42.4	20.9	23.6
2011			11.2	11.2			34.8	21.7	24.0
2012			11.9	12.1				20.9	27.3
Average 1992-2009	14.4	7.5	13.4	11.3	15.0	9.9	32.6	18.2	19.0

North Shore

Iceland scallops are harvested along the entire north shore of the Gulf of St. Lawrence, while sea scallops are taken only along the Lower North Shore. The North Shore is divided into 13 fishing areas located between the mouth of the Saguenay River and Blanc Sablon. Landings on the North Shore totalled around 18 t of meat between 2010 and 2012. Compared to 2007-2009, the average annual landings for 2010-2012 were down by 57% and the fishing effort dropped by 67%. The majority of these landings come from the Mingan Archipelago sector (Areas 16E and 16F) and the Lower North Shore (Area 15).

Upper North Shore (Scallop Fishing Areas 16A1, 16A2, 16B and 16C)

There were no landings recorded since 2010 in Upper North Shore's Areas (Figure 5). These areas are harvested by five fishers and the fishing effort is controlled by the number of licences and quotas.

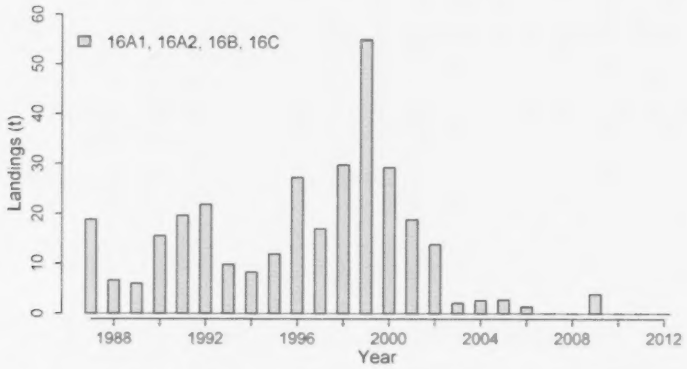

Figure 5. Scallop landings from Areas 16A1, 16A2, 16B and 16C.

Middle North Shore (Scallop Fishing Areas 16D, 16E, 16F, 16G and 18A)

Nine fishing licences provide access to Areas 16E, 16F and 18A, four for Area 16G, and all Middle North Shore scallop fishermen have access to Area 16D. Each Area is regulated by a quota, and there are daily and seasonal restrictions on fishing effort. Landings from the Middle North Shore only reached 19.7 t in 2012, a slight increase since 2010 but at a very low level compared to the beginning of the exploitation of these areas (Figure 6).

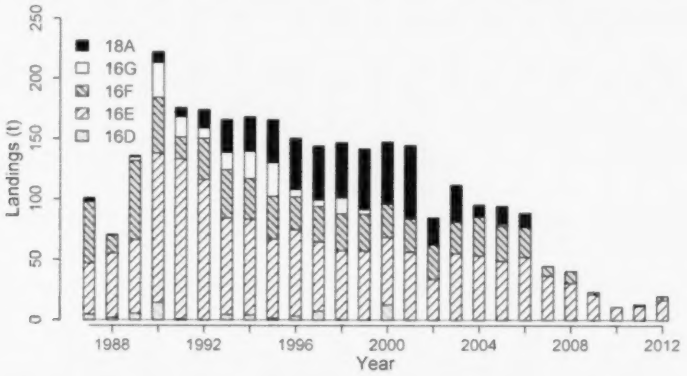

Figure 6. Scallop landings from Areas 16D, 16E, 16F, 16G and 18A.

From the Manitou River to the Île aux Perroquets lighthouse (Area 16D), there has not been any fishing effort since 2005. Since 1996, landings and yields have been low because of the sporadic nature of the fishing effort in this Area.

In Area 16E, landings were stable at 50–60 t from 1997 to 2006. They subsequently dropped until 2010, reaching 11 t, then increased slightly to 17 t in 2012 (Figure 6). During the same period, fishing effort dropped steadily from over 200 days at sea to under 100 days out of an

authorized total of 277. Since 2008, fishing effort had been primarily concentrated on a single bed: bed D south of Grande Île, where strong cohorts recruited to the fishery beginning in 2007. This strong recruitment had previously been identified as of 2003 during research surveys. The other beds, such as those on the islands in the Mingan archipelago, were not harvested in the past three seasons. Catches per unit effort from logbooks are comparable to the 1998–2011 average (Table 2) whereas CPUE observed until 2011 from the at-sea observer program have shown a downward trend since the 1990s. The weight of meat landed from 2010 to 2012 is up but still below the historical average (Table 3). This increase coincides with the harvesting of bed D, where strong cohorts recruited to the fishery around 2007.

The 2012 research survey indicates that the density of commercial-size scallops has dropped steadily since 2000 and represents the lowest value of the 1990–2012 series (Figure 7). The density of non-commercial-size scallops is above average.

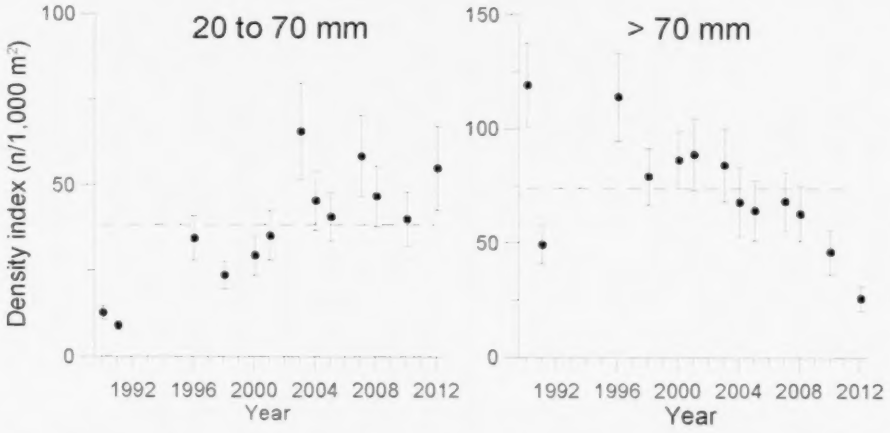

Figure 7. Density index of non commercial (20 to 70 mm) and commercial (> 70 mm) scallops based on research surveys in the Mingan sector, Area 16E (± standard error). The dotted lines represent the averages for the 1990-2012 series.

From 2010 to 2012, landings and fishing effort in Area 16F have been the lowest since harvesting began in this area. On average, they were 1.4 t and 12 days fished per season out of an authorized total of 164 days (Figure 6). CPUE from logbooks have been declining since 2001, reaching their lowest values of the historical series in 2010–2012 (Table 2). The same trend was observed by the at-sea observer program. The modal size of scallops landed from 2010 to 2012 is comparable to the historical average (Table 3). The 2010–2012 research surveys indicate that the densities of commercial-size scallops are below the 2004–2012 average whereas no trend is observed for non-commercial-size scallops between 2004 and 2012 (Figure 8).

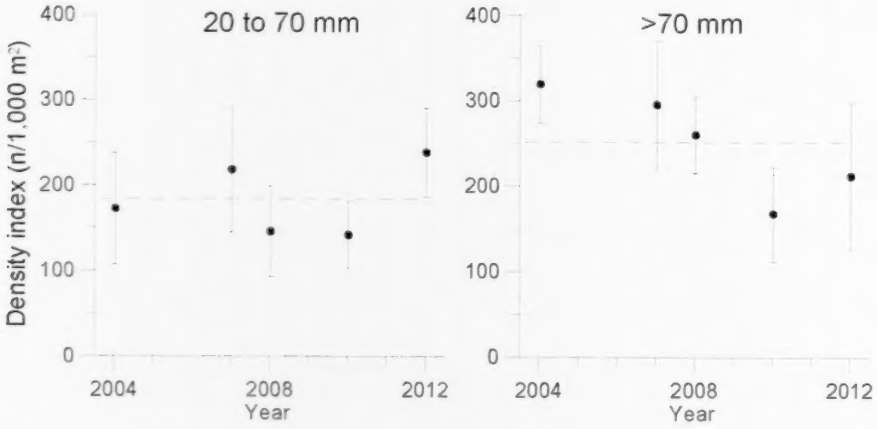

Figure 8. Density index of non commercial (20 to 70 mm) and commercial (> 70 mm) scallops based on research surveys in the Mingan sector, Area 16F (± standard error). The dotted lines represent the averages for the 2004-2012 series.

In Area 16G, between Johan Beetz Bay and Natashquan, landings, fishing effort and catches per unit effort varied until 2005 (Figure 6) and there have been no landings since.

Area 18A was not harvested between 2010 and 2012 despite a possibility of 258 days at sea (Figure 6). Landings and fishing effort dropped significantly in 2002 and continued to decline steadily until 2009. During the same period, a drop in CPUE was observed.

Lower North Shore (Scallop Fishing Areas 16H, 16I and 15)

In 2012, 8 scallop fishing licences were issued for Area 16H, and 33 regular and 2 exploratory licences were issued for Iceland scallop giving access to Areas 15 and 16I. Prior to 1992, most of the scallops landed on the Lower North Shore were sea scallops, but from 1992 to 1998, Iceland scallop landings from Areas 16H and 16I increased. Since 1998, landings of the two scallop species have fallen on the Lower North Shore, totalling only 0.2 t of meat in 2012 (Figure 9).There has been no fishing effort in Areas 16H and 16I since 2004 and 2005 respectively and few fishing effort in Area 15 in 2010-2012.

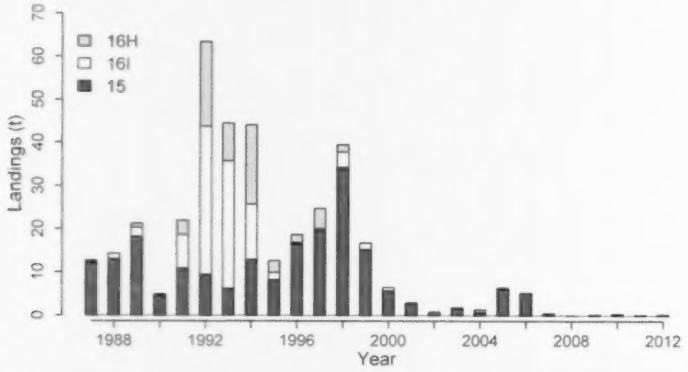

Figure 9. Scallop landings from Areas 16H, 16I and 15 of the Lower North Shore.

Gaspé Peninsula (Scallop Fishing Areas 17A1, 17A2, 18B1, 18B2, 18C and 19A)

The Gaspé Peninsula is composed of three fishing sectors: the St. Lawrence Estuary and north shore of the Gaspé Peninsula (17A1, 17A2 and 18B1), Anticosti Island (18B2 and 18C) and Chaleurs Bay (19A). The number of licenses is limited in each Area. In 2012, only one licence was issued for Areas 17A1 and 17A2, three in Areas 18B1, 18B2 and 18C and another three in Area 19A. Each area has its own fishing season, and quotas were set in Areas 17A1, 17A2, 18B2 and 18C.

From 1993 to 1999, landings in the Gaspé Peninsula increased gradually, reaching a peak of about 80 t of meat. Landings in this area dropped significantly in 2003 and have been low since (Figure 10). In 2012, landings in the Gaspé Peninsula totalled 2.2 t of meat, the lowest value of the historical series. Average annual landings from 2010 to 2012 dropped by 30% compared to 2007–2009, whereas fishing effort dropped by only 3%.

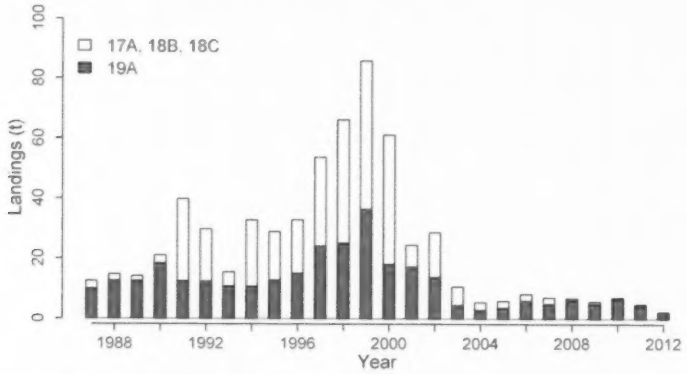

Figure 10. Scallop landings from Gaspé Peninsula.

There have been no fishing activities in Areas 17A1, 17A2, 18B1, 18B2 and 18C in 2010-2012.

In the wake of a reduced fishing effort in Area 19A in 2003, landings dropped significantly and then reached a certain level of stability with an average of 5 t per year (Figure 10). In 2012, landings were 2.2 t with a reduced fishing effort. Catches per unit effort have been declining since 2008. In 2012, they reached the lowest value of the historical series (Table 2). The weight of sea scallop meat landed from 2010 to 2012 is above the 1992–2011 series average (Table 3).

Magdalen Islands (Scallop Fishing Area 20)

The Magdalen Islands comprise a number of scallop beds, namely the following seabeds: Pointe-du-Ouest, Dix-Milles, Chaîne-de-la-Passe, Sud-Ouest, Île Brion and Banc de l'Est (Figure 11). Subarea 20E is closed to fishing as it is a refuge area for sea scallop.

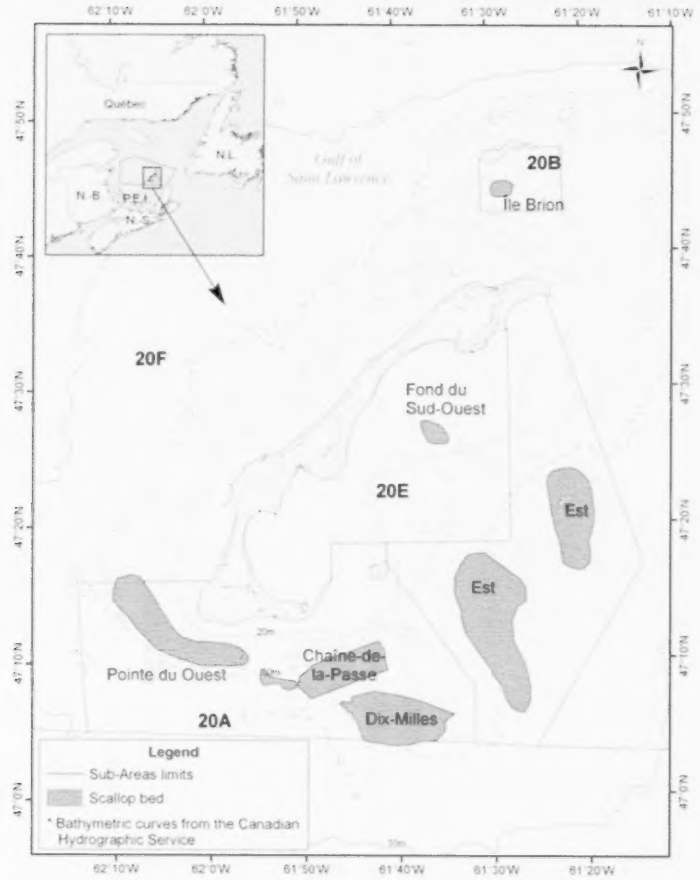

Figure 11. Sub-areas and main scallop fishing grounds in the Magdalen Islands.

Since 2007, the fishing effort in Area 20A has been controlled by a total authorized number of days at sea. In areas 20B, 20C and 20F, it has been controlled by a fishing season. The authorized effort was 345 days in 2010 and 322 days in 2011 and 2012. These maximums were almost reached in all of these years. Annual fishing effort has been stable since 2001 and is below the 1992–2009 series average. Landings increased significantly in 2007, from 18 to 46 t of meat, and have been stable since (Figure 12). The fishing effort of the past three years has been well distributed over the three main beds in Area 20A (Pointe-du-Ouest, Dix-Milles and Chaîne-de-la-Passe) and there is some effort every year in Area 20B (on Île Brion).

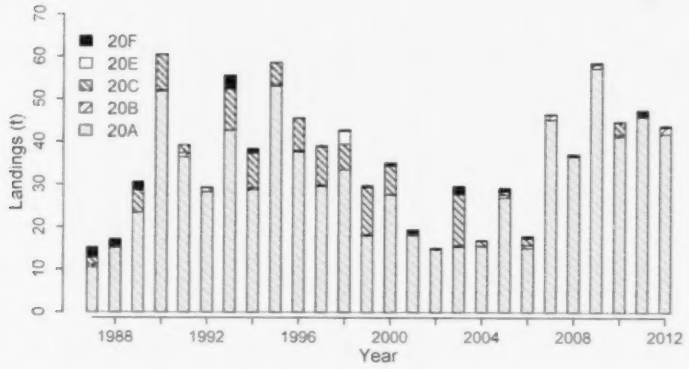

Figure 12. Scallop landings in Magdalen Islands.

Catches per unit effort estimated in 2010–2012 from logbooks dropped compared to CPUE observed in 2007–2009 but are still significantly higher than those of the early 2000s (Figure 13).

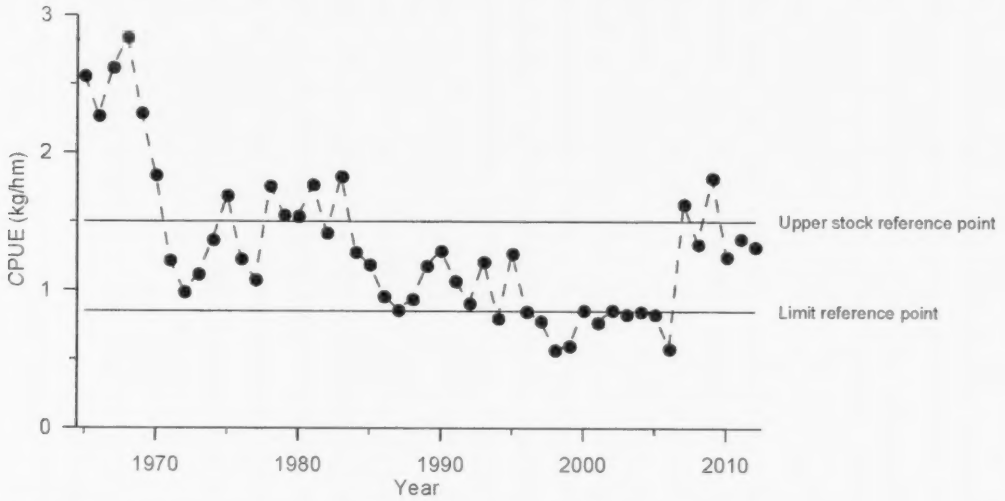

Figure 13. Catch per unit of effort (CPUE) estimated from logbooks in Area 20A.

According to the August research survey, the abundance of commercial-size scallops (> 100 mm) and those that will reach commercial size during the 2013 season (85–100 mm) are significantly higher than the historical series median (Figure 14). Medium-term recruitment (70–85 mm and < 70 mm) is average or below the series median.

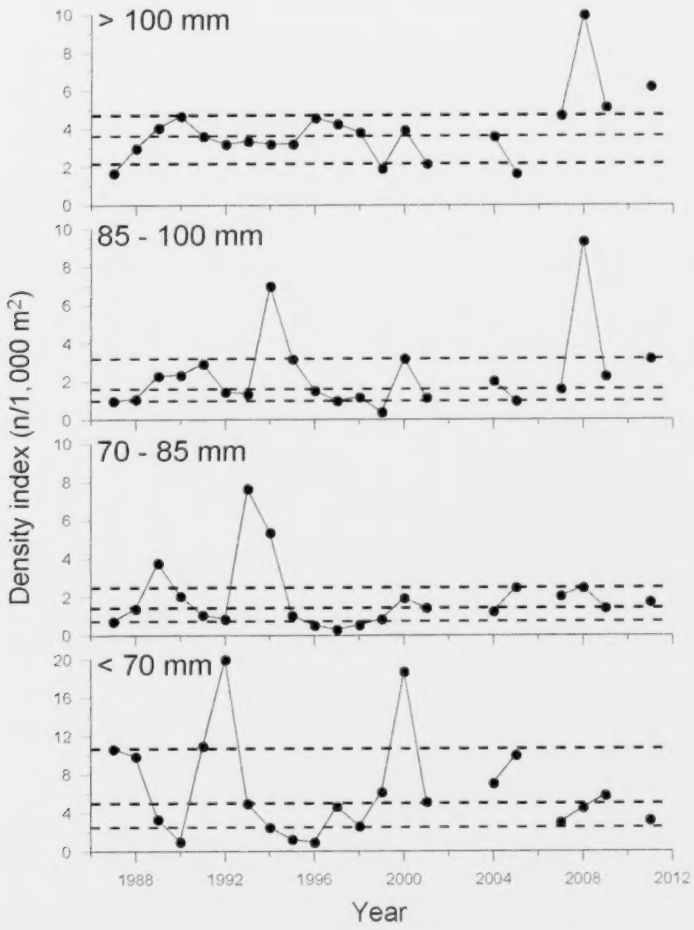

Figure 14. Density of sea scallops sampled at the Magdalen Islands during the research surveys according to size categories. The dotted lines indicate the 15th, 50th and 85th percentiles of the 1987-2008 series.

Decision rules to determine the fishing effort have been applied annually since 2010. First, the effort is determined by the CPUE of the last two seasons. If the CPUE of the last year is higher than the previous year, the average of two values is kept. Otherwise, only the CPUE of the last year is used. The chosen CPUE is placed on figure 15 in order to determine if it is low, average or high, and to determine the fishing effort for the following year. Subsequently, according to results of most recent research survey, the effort is adjusted upwards or downwards, in the grey area in figure 15. This method must be applied annually. For the 2013 season, the maximum fishing effort would be 314 days at sea in Area 20A.

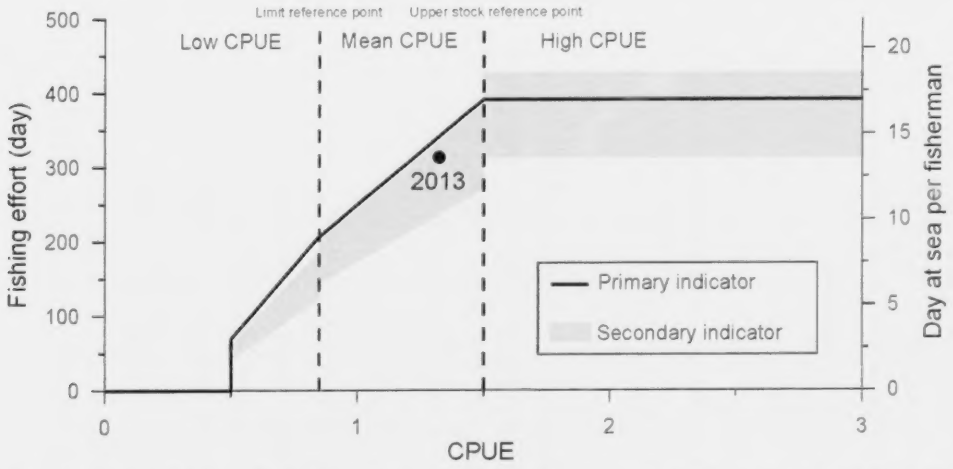

Figure 15. Determining fishing effort (days at sea) according to primary (CPUE) and secondary (research survey indices) for Area 20A.

Sources of Uncertainty

The current assessment is based on indices derived from logbooks and commercial catch samples at sea and dockside. In addition, in Areas 16E, 16F and 20, scientific surveys are conducted every two years. With no knowledge of sustainable exploitation rates, it is difficult to adjust the quotas or exploitation strategies other than with a cautious approach.

In several management areas, fishing effort is nil or very low, which does not allow reliable resource status indicators to be provided.

CONCLUSIONS AND ADVICE

North Shore

From the late 1980s to the mid 2000s, scallop landings from the North Shore have always represented more than 65% of Quebec catches. This proportion has fallen sharply in recent years due to poor socio-economic conditions for the scallop fishery in this region. Therefore, fishing effort has significantly declined on the North Shore. This downward trend began in the early 2000s.

Scallop Fishing Areas 16A1, 16A2, 16B, 16C, 16D, 16G, 16H and 18D

From 2010 to 2012, fishing effort was nil in areas 16A1, 16A2, 16B, 16C, 16D, 16G, 16H and 18D. The status of the resource is therefore unknown in these areas.

Scallop Fishing Areas 16E, 16F and 18A

Managing the effort by controlling the number of days at sea, developed in 2006 for areas 16E, 16F and 18A, was to keep the exploitation rate constant in a situation where all fishing effort was deployed. Constant effort meant a constant exploitation rate and the annual landing would fluctuate depending on the status of the stock. Since its introduction, maximum effort has never

been reached in all three areas. Some fishers have stopped harvesting certain areas or are not active. Therefore, Area 18A was not harvested between 2010 and 2012. Area 16F was only marginally harvested during this period and in Area 16E, the most accessible to fishers, a decrease in fishing effort was observed.

In Area 16E, the fishing effort was concentrated on a single bed; previously, the fishing effort was more evenly deployed over all scallop beds in this area. Despite the reduction in fishing effort, resource indicators show signs of population decline, suggesting that the exploitation rate could be too high. It is therefore recommended that the fishing effort in Area 16E be reduced while limiting the effort in bed D to that observed in recent years. In Area 16F, it is recommended to maintain the fishing effort at the same level as that observed in recent years,l

Scallop Fishing Areas 16l and 15

For several years, landings from the Lower North Shore (areas 16l and 15) have remained low. The information on this area is incomplete and insufficient. It is therefore difficult to assess the status of the resource based on this information.

Gaspé Peninsula

Fishing effort was nil in areas 17A1, 18B2 and 18C and very low in areas 17A2 and 18B1 from 2010 to 2012. The status of the resource is therefore unknown in these areas.

The measures that were adopted in 2001 in Area 19A, such as the decrease in the number of fishers, the gradual increase in the minimum legal size to 100 mm, and the implementation of protected areas, were put in place with the aim of reducing fishing effort and increasing the stock's reproductive potential. The impacts of these measures are not yet evident in the area accessible to fishing. These measures must be maintained because they can contribute to improving the status of the resource.

Magdalen Islands

The Magdalen Islands scallop population declined for about 20 years to a very low abundance level in 2006. In 2007, the potential fishing effort in Area 20A was reduced and controlled by a maximum number of fishing days at sea. Since then, landings have increased significantly and are stable and CPUE have remained above average. This improvement is due to the fact that strong cohorts recruited to the fishery during this period and because of tighter control of fishing effort.

The expected medium-term recruitment is lower than that observed in the early 2000s. It is therefore likely that CPUE decrease in the short term. The status of this population is still precarious given its high dependence on recruitment.

Decision rules to determine fishing effort have been in place since 2010. This effort is calculated using CPUE from logbooks and abundance indices from the research survey. Fishing effort is to be reviewed annually after the indicators have been updated. The maximum fishing effort recommended for Area 20A in 2013 is 314 days at sea.

OTHER CONSIDERATIONS

Conservation Measures

The conservation measures recommended for scallops are intended to maintain the capacity of all the beds to replenish themselves and to ensure their sustainability. Any approach designed to boost reproductive potential, whether by leaving more adults on the seabed or by creating refuge areas for spawners, should have a positive effect on conservation of the resource. Moreover, because the number of eggs a scallop produces increases exponentially in proportion to its size, allowing the population to age will result in a net gain in productivity. This strategy will increase the yield per recruit.

Scallops spawn in late summer, and juveniles settle on the seabed in the fall. Dredging the beds with fishing gear at this time of year reduces reproductive potential and stirs up the sediment, which can interfere with successful settlement of juveniles. Halting harvesting activities during the spawning and settlement periods (August to November) would limit the adverse effects of dredging on the substrate and benefit the survival of young scallops. Thus, a strategy for protecting seabeds where juveniles are very abundant should be promoted. Subsequently, these areas could be closed to fishing until the cohorts have reached commercial size in order to maximize the yield per recruit and minimize incidental scallop mortalities.

SOURCES OF INFORMATION

This Science Advisory Report is from the meeting of February 6, 2013 on theStock Assessment of Scallop in Quebec Inshore Waters. Additional publications from this meeting will be posted on the Fisheries and Oceans Canada (DFO) Science Advisory Schedule as they become available.

Bourdages, H. et Goudreau, P. 2010. Évaluation des stocks de pétoncle des eaux côtières du Québec en 2009 : données de la pêche commerciale. Secr. can. de consult. sci. du MPO. Doc. de rech. 2010/068. vi + 69 p.

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